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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
NOBUO KAIFU, ET AL.	: EXAMINER: HEINCER, L. J.
SERIAL NO: 10/574,774	:
FILED: MAY 1, 2007 RCE FILED: FEBRUARY 17, 2009	: GROUP ART UNIT: 1796
FOR: PROCESS FOR PRODUCING RESORCINOL-FORMALIN RESIN	:

RESPONSE

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Responsive to the Notification of Non-Compliant Appeal Brief, dated October 13, 2009 (Notification), below is a corrected CLAIMS APPENDIX.

Respectfully submitted,

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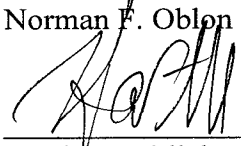
Norman F. Oblon



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CLAIMS APPENDIX

Claim 1. A process for producing a resorcinol-formalin resin containing no inorganic salts, which comprises:

(1) adding, to a water solvent, resorcinol (A) in an amount of 20 to 150 parts by weight relative to 100 parts by weight of water, an inorganic salt (B) in an amount of 20 to 80 parts by weight relative to 100 parts by weight of water, and an organic solvent (C) having a solubility parameter of 7.0 to 12.5 and capable of dissolving the resorcinol-formalin resin in an amount of 10 to 200 parts by weight relative to 100 parts by weight of resorcinol (A), thereby forming a mixture;

(2) stirring the mixture at a liquid temperature not higher than the boiling point of the organic solvent (C) to give a two-phase system containing no remaining solid matter;

(3) adding a catalytic amount of an organic acid or inorganic acid (D) to the mixture formed in step (2);

(4) adding 1 to 40% formalin (E) dropwise to the mixture formed in step (3) in a molar ratio of formaldehyde/resorcinol of 0.3 to 0.8 under stirring over a period of 1 to 300 minutes thereby forming a reaction system, while maintaining the reaction system at 0 to 60°C;

(5) stirring the mixture formed in step (4) for further 10 to 60 minutes after the completion of the dropwise addition to cause a liquid-liquid heterogeneous reaction to proceed;

(6) allowing the reaction system to stand while maintaining it at the temperature of the reaction to separate it into two layers, which are an aqueous layer and a reaction product layer;

(7) removing the aqueous layer;

(8) adding an organic solvent (C) in an amount of 1 to 5 equivalents to the amount of the reaction product to the reaction product layer which is an organic solvent layer to effect dilution;

(9) adding water to the reaction product layer in an amount which is half of the amount of the organic solvent;

(10) stirring the reaction system after adding of said organic solvent (C) and said water while maintaining its temperature to be not higher than the boiling point;

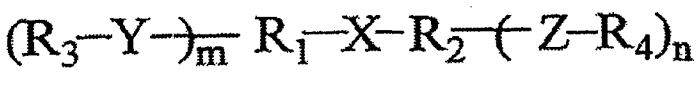
(11) separating the reaction system of step (10) into two layers, including an aqueous layer, after allowing the reaction system to stand; and then

(12) removing the aqueous layer to obtain a resorcinol-formalin resin,

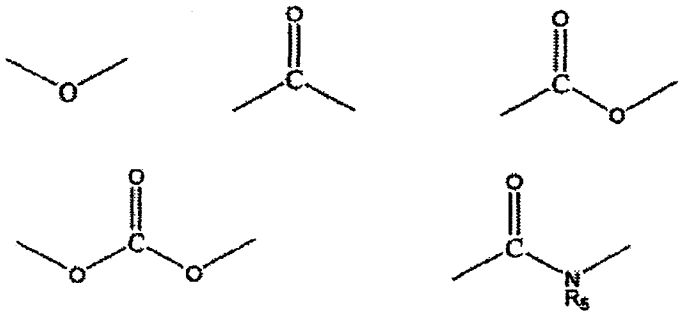
wherein said reaction is a one-stage reaction and liquid-liquid distribution is conducted in the same reactor, and

wherein the organic solvent (C) is an organic solvent represented by the following general formula [1]:

General formula [1]:



X , Y , Z :



wherein m represents 0 or 1, n represents 0 or 1, and R_1, R_2, R_3, R_4, and R_5 each independently represents a methyl group, an ethyl group, an n-propyl group, a 2-propyl group, an n-butyl group, a secondary butyl group, an isobutyl group, or a tertiary butyl group; R_1 and R_2 may be combined to form a ring when m=n=0, R_2 and R_3 may be combined to form a ring when m=1 and n=0, and R_3 and R_4 may be combined to form a ring when m=n=1, with the proviso that when X is -O- and m=n=0, R_1 and R_2 are combined to form a ring.

Claim 2. The process according to claim 1, wherein the 1 to 40% formalin (E) is intermittently added dropwise in a molar ratio of formaldehyde/resorcinol of 0.3 to 0.8 under stirring over a period of 20 to 300 minutes in step (4).

Claim 3. The process according to any one of claims 1 to 2, wherein a peak area corresponding to resorcinol pentanuclear or higher nuclear bodies present in said resorcinol-formalin resin is from 30% to 55% relative to the whole peak area and a peak area corresponding to the resorcinol monomer is from 3% to 9% relative to the whole peak area, the peak areas being obtained by gel permeation chromatographic analysis of the resorcinol-formalin resin.

Claim 4. The process according to claim 1, wherein the organic solvent (C) is an organic solvent having a solubility parameter of 9.0 to 11.0.

Claim 6. The process according to claim 1, wherein the organic solvent (C) is used as a mixture of two or more thereof.

Claim 7. The process according to claim 1, wherein the inorganic salt (B) is a salt formed from one or two or more cations selected from alkali metals and alkaline earth metals and one or two or more anions selected from a sulfate ion, a nitrate ion, a chlorine ion, a bromine ion, an iodine ion, and a thiocyanate ion.

Claim 8. The process according to claim 1, wherein the inorganic salt (B) is calcium chloride.

Claim 9. The process according to claim 1, wherein the amount of the organic solvent (C) added in step (1) is from 30 to 100 parts by weight relative to 100 parts by weight of resorcinol (A).

Claim 10. The process according to claim 1, wherein the organic acid or inorganic acid (D) is hydrochloric acid.

Claim 11. The process according to claim 1, wherein the mole number of formaldehyde in the formalin (E) relative to the mole number of resorcinol (A) is in a molar ratio of formaldehyde/resorcinol of 0.5 to 0.8.

Claim 12. The process according to claim 1, wherein time for the dropwise addition of the formalin (E) is from 20 to 120 minutes.

Claim 13. The process according to claim 1, wherein after step (12), water is added in an amount of 1 to 10 equivalents by weight to the resorcinol-formalin resin in the organic

solvent (C) solution of the resorcinol-formalin resin and the organic solvent (C) is removed by distillation to finally obtain an aqueous resorcinol-formalin resin solution having a reaction product concentration of 30 to 80%.

Claim 14. The process according to claim 1, wherein after step (12), the organic solvent (C) is added to the organic solvent layer obtained by the separation into two layers after allowing to stand and the removal of the aqueous layer, in an amount of 2 to 10 equivalents to the weight of the reaction product to effect dilution, water is removed by distillation at the azeotropic temperature of water and the organic solvent, and then solid matter is removed by filtration after cooling to room temperature.

Claim 15. A resorcinol-formalin resin containing no inorganic salts, produced by a production process comprising:

(1) adding, to a water solvent, resorcinol (A) in an amount of 20 to 150 parts by weight relative to 100 parts by weight of water, an inorganic salt (B) in an amount of 20 to 80 parts by weight relative to 100 parts by weight of water, and an organic solvent (C) having a solubility parameter of 7.0 to 12.5 and capable of dissolving the resorcinol-formalin resin in an amount of 10 to 200 parts by weight relative to 100 parts by weight of resorcinol (A),thereby forming a mixture;

(2) stirring the mixture at a liquid temperature not higher than the boiling point of the organic solvent (C) to give a two-phase system containing no remaining solid matter;

(3) adding a catalytic amount of an organic acid or inorganic acid (D) to the mixture formed in step (2);

(4) adding 1 to 40% formalin (E) dropwise to the mixture formed in step (3) in a molar ratio of formaldehyde/resorcinol of 0.3 to 0.8 under stirring over a period of 1 to 300 minutes thereby forming a reaction system, while maintaining the reaction system at 0 to 60°C;

(5) stirring the mixture formed in step (4) for further 10 to 60 minutes after the completion of the dropwise addition to cause a liquid-liquid heterogeneous reaction to proceed;

(6) allowing the reaction system to stand while maintaining it at the temperature of the reaction to separate it into two layers, which are an aqueous layer and a reaction product layer;

(7) removing the aqueous layer;

(8) adding an organic solvent (C) in an amount of 1 to 5 equivalents to the amount of the reaction product to the reaction product layer which is an organic solvent layer to effect dilution;

(9) adding water to the reaction product layer in an amount which is half of the amount of the organic solvent;

(10) stirring the reaction system after adding of said organic solvent (C) and said water while maintaining its temperature to be not higher than the boiling point;

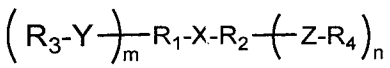
(11) separating the reaction system of step (10) into two layers, including an aqueous layer, after allowing the reaction system to stand; and then

(12) removing the aqueous layer to obtain a resorcinol-formalin resin,

wherein said reaction is a one-stage reaction and liquid-liquid distribution is conducted in the same reactor, and

wherein the organic solvent (C) is a ketone represented by the following general formula [1]:

General formula [1]:



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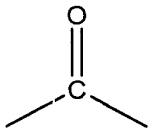

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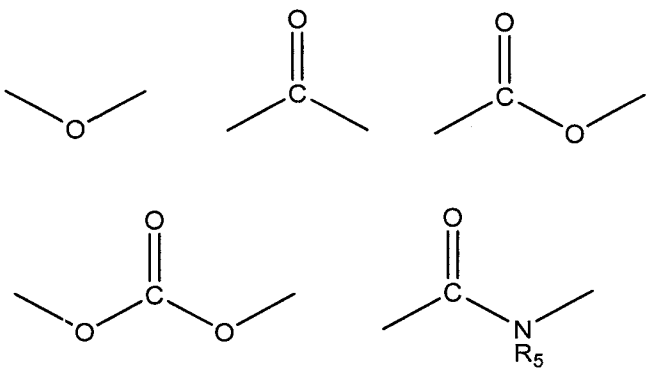

wherein m represents 0 or 1, n represents 0 or 1, and R_1, R_2, R_3, R_4, and R_5 each independently represents a methyl group, an ethyl group, an n-propyl group, a 2-propyl group, an n-butyl group, a secondary butyl group, an isobutyl group, or a tertiary butyl group; R_1 and R_2 may be combined to form a ring when m=n=0, R_2 and R_3 may be combined to form a ring when m=1 and n=0, and R_3 and R_4 may be combined to form a ring when m=n=1.

Claim 16. The resorcinol-formalin resin according to claim 15, wherein the 1 to 40% formalin (E) is intermittently added dropwise in a molar ratio of formaldehyde/resorcinol of 0.3 to 0.8 under stirring over a period of 20 to 300 minutes in step (4).

Claim 17. The resorcinol-formalin resin according to any one of claims 15 to 16, wherein a peak area corresponding to resorcinol pentanuclear or higher nuclear bodies present in said resorcinol-formalin resin is from 30% to 55% relative to the whole peak area and a peak area corresponding to the resorcinol monomer is from 3% to 9% relative to the whole peak area, the peak areas being obtained by gel permeation chromatographic analysis of the resorcinol-formalin resin.

Claim 18. The resorcinol-formalin resin according to claim 15, wherein the organic solvent (C) is an organic solvent having a solubility parameter of 9.0 to 11.0.

Claim 20. The resorcinol-formalin resin according to claim 15, wherein the organic solvent (C) is used as a mixture of two or more thereof.

Claim 21. The resorcinol-formalin resin according to claim 15, wherein after step (12), water is added in an amount of 1 to 10 equivalents by weight to the resorcinol-formalin resin in the organic solvent (C) solution of the resorcinol-formalin resin and the organic solvent (C) is removed by distillation to finally obtain an aqueous resorcinol-formalin resin solution having a reaction product concentration of 30 to 80%.

Claim 22. The resorcinol-formalin resin according to claim 15, wherein after step (12), the organic solvent (C) is added to the organic solvent layer obtained by the separation into two layers after allowing to stand and the removal of the aqueous layer, in an amount of 2 to 10 equivalents to the weight of the reaction product to effect dilution, water is removed

by distillation at the azeotropic temperature of water and the organic solvent, and then solid matter is removed by filtration after cooling to room temperature.

Claim 23: The resorcinol-formalin resin according to claim 15, wherein the organic solvent (C) is methyl ethyl ketone or methyl isobutyl ketone.